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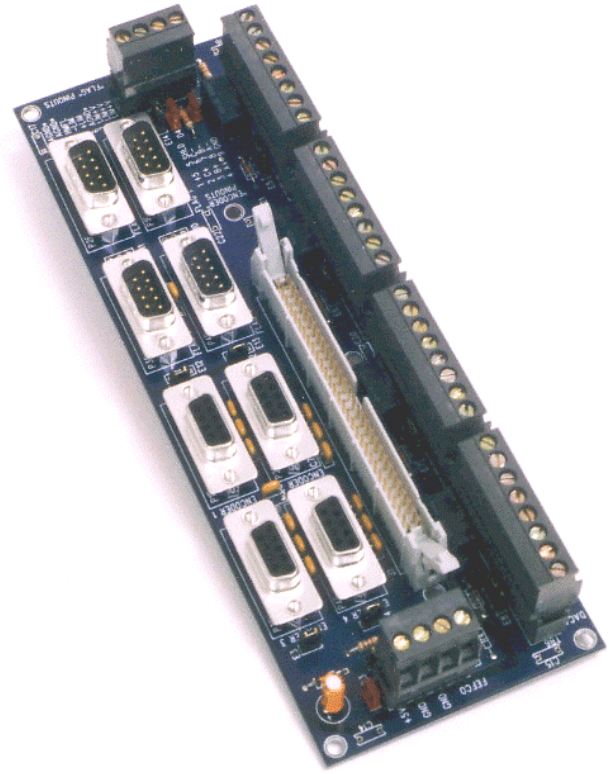
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User's Manual



EZ Interface

Revision 1

January 7, 1999

For Use With Delta Tau's PMAC Motion Controller

SOUND SOLUTIONS

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Introduction

The *EZ Interface* board is an interface board designed to interface Delta Tau's *PMAC*? (Programmable Multi-Axis Controller) with the typical external connections of your servo system (i.e. your amplifiers, encoders, limit switches, etc.). As its name implies, this board provides an easy plug-n-play interface from PMAC to external components through the following features:

- *Compatible with PMAC-PC, PMAC-Lite, PMAC-VME, and Mini-PMAC*
- *Socketed & removable terminal blocks*
- *Pin descriptions provided right on the board*
- *Status LEDs for +5V, +12V, and -12V*
- *UL rated relays for amplifier enable signals*
- *DB9 connectors for encoders and flags (home, amp fault, and limits)*
- *Dedicated pins for cable shielding with optional connection to ground*
- *Multiple connection points for grounds and voltage supplies*
- *DIN rail mountable (with housing)*
- *Six mounting holes for standalone use*
- *Over-voltage protection when using external 5V supply*
- *Lever assisted connector to PMAC's "JMACH" cable*
- *Digital and analog ground planes to reduce electrical noise*

About Revision 1

If you are using an *EZ Interface* that was purchased prior to December 1997, please read this section. As of December 1997, the *EZ Interface* has been incorporated with new and improved features to provide better reliability. A summary of the new changes are as follows:

Changes:

1. The four encoder connectors (9 pin DB9 connectors, for encoders 1 through 4) are now **female** connectors. They also have new pin assignments.

Pin Number	*Previous EZ Interface*	***EZ Interface Rev 1***
1	C+	**+5V**
2	B+	**C+**
3	A+	**B+**
4	+5V	**A+**
5	GND	**Shield**
6	C-	**C-**
7	B-	**B-**
8	A-	**A-**
9	Shield	**GND**

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2. The four "Flag" connectors (9 pin male DB9 connectors, for encoders 1 through 4) are now **male** connectors.
3. The length of the *EZ Interface* has been increased to 7.785 inches (197.74 mm).

Additions:

1. The *EZ Interface* is now a four layer board with digital and analog ground planes on the top and bottom layers. This helps shield the signals on the board from receiving and emitting electrical noise. Decoupling capacitors are provided between the circuit board's and the DB9 connectors' mounting holes and the ground planes.
2. The four encoder connectors now have decoupling capacitors connected across each differential encoder signal pair. This helps reject electrical noise received by the encoder cables that may contaminate the encoder signals.
3. The power signals on the "Flag" connectors (9 pin male DB9 connectors, for flag signals 1 through 4) , now called **LIM+V**, can now be jumpered to provide +15 volts (as in the previous revision of the *EZ Interface*), or can be jumpered to provide a separate voltage through pin 4 of TB2 (this pin is labeled **LIM+V**). The latter case allows the use of electronically powered travel limit switches requiring a supply voltage other than the analog +15 volts normally used.

Connector Description

The *EZ Interface* board contains several connectors. The function of each of these connectors are described below.

J1 : 60 Pin Header Connector to PMAC's "JMACH"

This connector serves as the main connection between Delta Tau's *PMAC*[?] and the *EZ Interface* board. On PMAC's "JMACH" connector (PMAC's **J7** and **J8** for the *PMAC-PC* version *PMAC-Lite* version, and/or PMAC's P2 and P3 for the *PMAC-VME* version), a 60-pin ribbon cable is connected. The other end of this ribbon cable connects to **J1** on the *EZ Interface* board. All the encoder, analog, and various flag signals are carried on this cable. Also, the +5, +12 and -12 volt power supply signals are also included.

TB1 : 4 Pin Removable Terminal Block (+5V, GND, FEFCO)

This removable terminal block provides the digital +5 volt power supply, two connections to digital ground (GND), and the FEFCO (fatal following error/watch dog) signal from PMAC. The nearby green LED lights when a proper 5 volt level is detected. This terminal block can be used to bring in a 5 volt supply to power PMAC and the encoders (for standalone applications), or it can be used to connect to PMAC's already-provided 5 volt supply (in this case, PMAC usually is provided 5 volts from the bus). Jumper **E9** provides connection from this terminal block to pins 1 and 2 on connector **J1**. Allowing you to have a separate 5 volt supply for the encoders, if necessary.

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TB2 : 4 Pin Removable Terminal Block (+12V, -12V, AGND)

This removable terminal block provides the analog +12 and -12 volt power supply, a separate power supply for the travel limit switches (LIM+V) and a connection to analog ground (AGND). The nearby green LEDs light when a proper +12 and -12 volt level is detected for each voltage. This terminal block can be used to bring in a +12 and -12 volt supply to power PMAC (for standalone applications).

TB3 - TB6 : 8 Pin Removable Terminal Block (DAC, AENA, FAULT)

These removable terminal blocks provide the following motor channel signals: DAC+, DAC-, amplifier enable (AENA), amplifier fault (FAULT), analog +12 volt power supply, analog ground (AGND), and two connections to the amplifier enable relays. Each of the four terminal blocks are for each of the four motor channels, with the DAC+, DAC-, AENA, and FAULT signals unique to each motor channel. All signals originate from PMAC.

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TB1

Pin	Symbol	Function	Description	Notes
1	+5V	Common	+5VDC supply	*see E9*
2	GND	Common	PMAC's **digital** ground	
3	GND	Common		
4	FEFCO	Output	Fatal Following Error / Watchdog Timer	

TB2

Pin	Symbol	Function	Description	Notes
1	A+12V	Input	+12V **analog** supply	
2	A-12V	Input	-12V **analog** supply	
3	AGND	Common	PMAC's **analog** ground	
4	LIM+V	Input	Travel limits' **analog** supply	*See E14-- can be shorted to A+12V*

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TB3 Motor #1 Analog Signals

Pin	Symbol	Function	Description	Notes
1	DAC1+	Output	Motor 1'sDAC+ output	*connects to JMACHx, pin 43*
2	DAC1-	Output	Motor 1's DAC- output	*connects to JMACHx, pin 45*
3	AENA1	Output	Motor 1's amplifier enable	*see E5 and TB3 pins 7 and 8; if E5 is jumpered 1-2, this signal comes from the common contact point on the relay; if E5 is jumpered 2-3. this signal comes directly from PMAC's AENA*
4	FAULT1	Input	Motor 1's amplifier fault signal (comes from amplifier)	
5	A+12V	Input	+12V **analog** supply	
6	AGND	Common	PMAC's **analog** ground	
7	RLY1A	Input	normally closed connection point on relay	*see E5 and schematics*
8	RLY1B	Input	normally open connection point on relay	*see E5 and schematics*

TB4 Motor #2 Analog Signals

Pin	Symbol	Function	Description	Notes
1	DAC2+	Output	Motor 2's DAC+ output	*connects to JMACHx, pin 44*
2	DAC2-	Output	Motor 2's DAC- output	*connects to JMACHx, pin 46*
3	AENA2	Output	Motor 2's amplifier enable	*see E5 and TB4 pins 7 and 8; if E5 is jumpered 1-2, this signal comes from the common contact point on the relay; if E5 is jumpered 2-3. this signal comes directly from PMAC's AENA*
4	FAULT2	Input	Motor 2's amplifier fault signal (comes from amplifier)	
5	A+12V	Input	+12V **analog** supply	
6	AGND	Common	PMAC's **analog** ground	
7	RLY2A	Input	normally closed connection point on relay	*see E6 and schematics*
8	RLY2B	Input	normally open connection point on relay	*see E6 and schematics*

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TB5 Motor #3 Analog Signals

Pin	Symbol	Function	Description	Notes
1	DAC3+	Output	Motor 3's DAC+ output	*connects to JMACHx, pin 29*
2	DAC3-	Output	Motor 3's DAC- output	*connects to JMACHx, pin 31*
3	AENA3	Output	Motor 3's amplifier enable	*see E5 and TB5 pins 7 and 8; if E5 is jumpered 1-2, this signal comes from the common contact point on the relay; if E5 is jumpered 2-3. this signal comes directly from PMAC's AENA*
4	FAULT3	Input	Motor 3's amplifier fault signal (comes from amplifier)	
5	A+12V	Input	+12V **analog** supply	
6	AGND	Common	PMAC's **analog** ground	
7	RLY1A	Input	normally closed connection point on relay	*see E7 and schematics*
8	RLY1B	Input	normally open connection point on relay	*see E7 and schematics*

TB6 Motor #4 Analog Signals

Pin	Symbol	Function	Description	Notes
1	DAC4+	Output	Motor 4's DAC+ output	*connects to JMACHx, pin 30*
2	DAC4-	Output	Motor 4's DAC- output	*connects to JMACHx, pin 32*
3	AENA4	Output	Motor 4's amplifier enable	*see E5 and TB6 pins 7 and 8; if E5 is jumpered 1-2, this signal comes from the common contact point on the relay; if E5 is jumpered 2-3. this signal comes directly from PMAC's AENA*
4	FAULT4	Input	Motor 4's amplifier fault signal (comes from amplifier)	
5	A+12V	Input	+12V **analog** supply	
6	AGND	Common	PMAC's **analog** ground	
7	RLY1A	Input	normally closed connection point on relay	*see E8 and schematics*
8	RLY1B	Input	normally open connection point on relay	*see E8 and schematics*

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ENCODER 1 (DB9 Female)

Pin	Symbol	Function	Description	Notes
1	+5	Output	+5VDC supply for encoder	
2	C+	Input	Encoder 1's "C+" signal	
3	B+	Input	Encoder 1's "B+" signal	
4	A+	Input	Encoder 1's "A+" signal	
5	SHLD	Shield	Connect to shield on encoder cable	*see E1-- can be shorted to PMAC digital ground*
6	C-	Input	Encoder 1's "C-" signal	
7	B-	Input	Encoder 1's "B-" signal	
8	A-	Input	Encoder 1's "A-" signal	
9	GND	Common	PMAC's **digital** ground	

ENCODER 2 (DB9 Female)

Pin	Symbol	Function	Description	Notes
1	+5	Output	+5VDC supply for encoder	
2	C+	Input	Encoder 2's "C+" signal	
3	B+	Input	Encoder 2's "B+" signal	
4	A+	Input	Encoder 2's "A+" signal	
5	SHLD	Shield	Connect to shield on encoder cable	*see E2-- can be shorted to PMAC digital ground*
6	C-	Input	Encoder 2's "C-" signal	
7	B-	Input	Encoder 2's "B-" signal	
8	A-	Input	Encoder 2's "A-" signal	
9	GND	Common	PMAC's **digital** ground	

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ENCODER 3 (DB9 Female)

Pin	Symbol	Function	Description	Notes
1	+5	Output	+5VDC supply for encoder	
2	C+	Input	Encoder 3's "C+" signal	
3	B+	Input	Encoder 3's "B+" signal	
4	A+	Input	Encoder 3's "A+" signal	
5	SHLD	Shield	Connect to shield on encoder cable	*see E3-- can be shorted to PMAC digital ground*
6	C-	Input	Encoder 3's "C-" signal	
7	B-	Input	Encoder 3's "B-" signal	
8	A-	Input	Encoder 3's "A-" signal	
9	GND	Common	PMAC's **digital** ground	

ENCODER 4 (DB9 Female)

Pin	Symbol	Function	Description	Notes
1	+5	Output	+5VDC supply for encoder	
2	C+	Input	Encoder 4's "C+" signal	
3	B+	Input	Encoder 4's "B+" signal	
4	A+	Input	Encoder 4's "A+" signal	
5	SHLD	Shield	Connect to shield on encoder cable	*see E4-- can be shorted to PMAC digital ground*
6	C-	Input	Encoder 4's "C-" signal	
7	B-	Input	Encoder 4's "B-" signal	
8	A-	Input	Encoder 4's "A-" signal	
9	GND	Common	PMAC's **digital** ground	

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FLAG 1 (DB9 Male)

Pin	Symbol	Function	Description	Notes
1	AGND	Common	PMAC's **analog** ground	
2	AGND	Common	PMAC's **analog** ground	
3	HMFL	Input	Motor 1's home flag input	*Connects to JMACHx pin 55*
4	-LIM	Input	Motor 1's *negative* travel limit input	*Connects to JMACHx pin 53*
5	+LIM	Input	Motor 1'*positive* travel limit input	*Connects to JMACHx pin 51*
6	AGND	Common	PMAC's **analog** ground	
7	LIM+V	Input/Output	Travel limits' **analog** supply	*See E14-- can be shorted to A+12V*
8	LIM+V	Input/Output	Travel limits' **analog** supply	*See E14-- can be shorted to A+12V*
9	LIM+V	Input/Output	Travel limits' **analog** supply	*See E14-- can be shorted to A+12V*

FLAG 2 (DB9 Male)

Pin	Symbol	Function	Description	Notes
1	AGND	Common	PMAC's **analog** ground	
2	AGND	Common	PMAC's **analog** ground	
3	HMFL	Input	Motor 2's home flag input	*Connects to JMACHx pin 56*
4	-LIM	Input	Motor 2's *negative* travel limit input	*Connects to JMACHx pin 54*
5	+LIM	Input	Motor 2's *positive* travel limit input	*Connects to JMACHx pin 52*
6	AGND	Common	PMAC's **analog** ground	
7	LIM+V	Input/Output	Travel limits' **analog** supply	*See E14-- can be shorted to A+12V*
8	LIM+V	Input/Output	Travel limits' **analog** supply	*See E14-- can be shorted to A+12V*
9	LIM+V	Input/Output	Travel limits' **analog** supply	*See E14-- can be shorted to A+12V*

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FLAG 3 (DB9 Male)

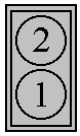
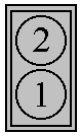
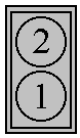
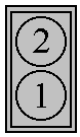
Pin	Symbol	Function	Description	Notes
1	AGND	Common	PMAC's **analog** ground	
2	AGND	Common	PMAC's **analog** ground	
3	HMFL	Input	Motor 3's home flag input	*Connects to JMACHx pin 41*
4	-LIM	Input	Motor 3's *negative* travel limit input	*Connects to JMACHx pin 39*
5	+LIM	Input	Motor 3's *positive* travel limit input	*Connects to JMACHx pin 37*
6	AGND	Common	PMAC's **analog** ground	
7	LIM+V	Input/Output	Travel limits' **analog** supply	*See E14-- can be shorted to A+12V*
8	LIM+V	Input/Output	Travel limits' **analog** supply	*See E14-- can be shorted to A+12V*
9	LIM+V	Input/Output	Travel limits' **analog** supply	*See E14-- can be shorted to A+12V*

FLAG 4 (DB9 Male)

Pin	Symbol	Function	Description	Notes
1	AGND	Common	PMAC's **analog** ground	
2	AGND	Common	PMAC's **analog** ground	
3	HMFL	Input	Motor 4's home flag input	*Connects to JMACHx pin 42*
4	-LIM	Input	Motor 4's *negative* travel limit input	*Connects to JMACHx pin 40*
5	+LIM	Input	Motor 4's *positive* travel limit input	*Connects to JMACHx pin 38*
6	AGND	Common	PMAC's **analog** ground	
7	LIM+V	Input/Output	Travel limits' **analog** supply	*See E14-- can be shorted to A+12V*
8	LIM+V	Input/Output	Travel limits' **analog** supply	*See E14-- can be shorted to A+12V*
9	LIM+V	Input/Output	Travel limits' **analog** supply	*See E14-- can be shorted to A+12V*

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E1 - E4: SHORT ENCODER SHIELD TO GND

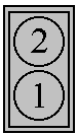
E POINT & PHYSICAL LAYOUT	LOCATION	DESCRIPTION	DEFAULT
E1 		Jump pin 1 to 2 to short Encoder 1's shield to digital ground (GND).	Jumper installed.
E2 		Jump pin 1 to 2 to short Encoder 2's shield to digital ground (GND).	Jumper installed.
E3 		Jump pin 1 to 2 to short Encoder 3's shield to digital ground (GND).	Jumper installed.
E4 		Jump pin 1 to 2 to short Encoder 4's shield to digital ground (GND).	Jumper installed.

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E5 - E8: USE RELAY FOR AMP ENABLE

E POINT & PHYSICAL LAYOUT	LOCATION	DESCRIPTION	DEFAULT
E5 		Jump pin 1 to 2 to use the relay for PMAC's "AENA1" (amp enable 1) signal. Jump pin 2 to 3 use the AENA1 signal directly from PMAC.	Jumper installed on pins 1 to 2.
E6 		Jump pin 1 to 2 to use the relay for PMAC's "AENA2" (amp enable 2) signal. Jump pin 2 to 3 use the AENA2 signal directly from PMAC.	Jumper installed on pins 1 to 2.
E7 		Jump pin 1 to 2 to use the relay for PMAC's "AENA3" (amp enable 3) signal. Jump pin 2 to 3 use the AENA3 signal directly from PMAC.	Jumper installed on pins 1 to 2.
E8 		Jump pin 1 to 2 to use the relay for PMAC's "AENA4" (amp enable 4) signal. Jump pin 2 to 3 use the AENA4 signal directly from PMAC.	Jumper installed on pins 1 to 2.

E9: CONNECT PMAC'S 5V TO EXTERNAL 5V

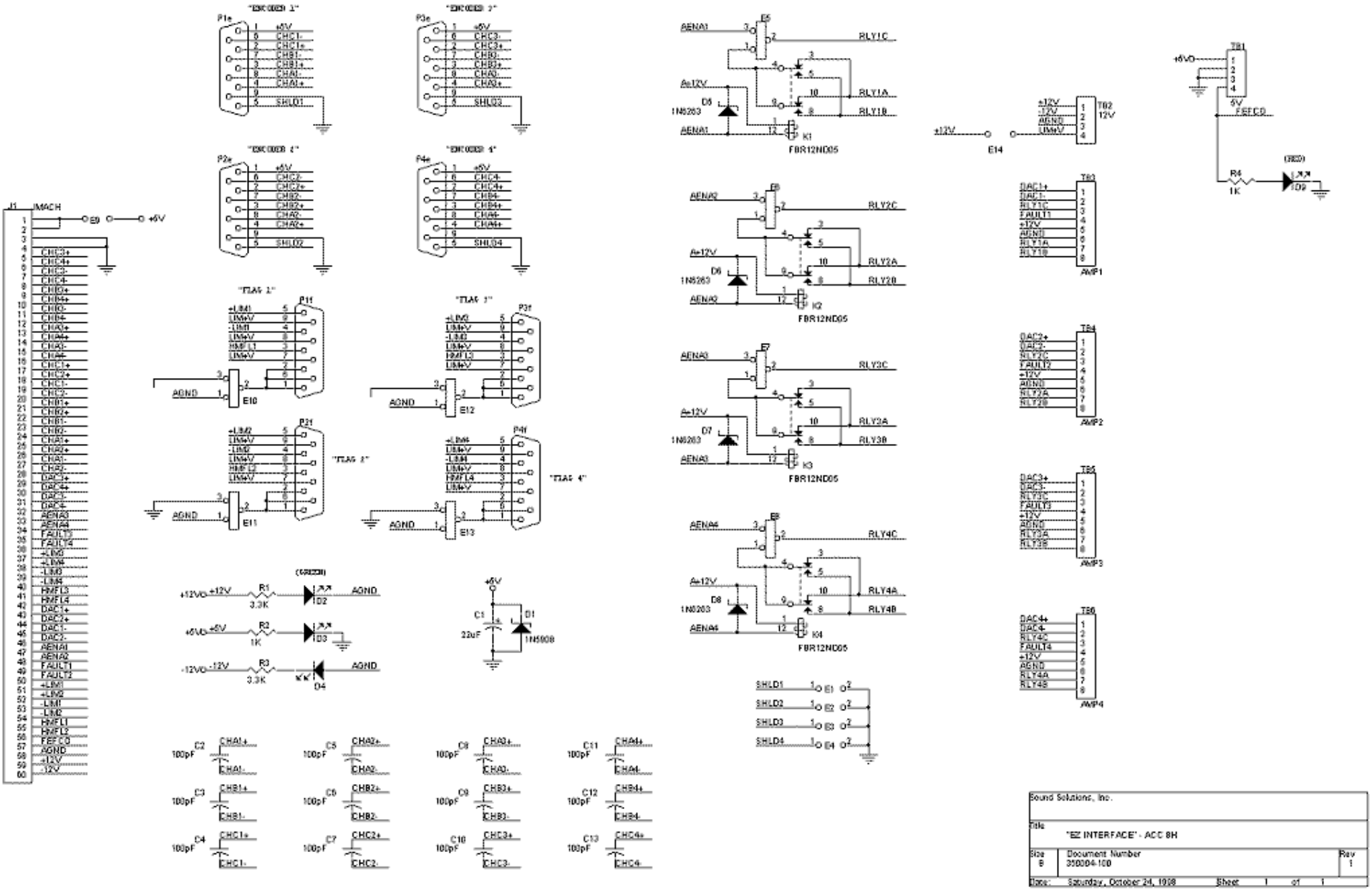
E POINT & PHYSICAL LAYOUT	LOCATION	DESCRIPTION	DEFAULT
E9 		Jump pin 1 to 2 to tie PMAC's 5V supply (pins 1,2 of **J1**) to the external 5V supply connection on pin 1 of **TB1** and the 5V going to the encoders (pin 4 of **P1** through **P4**).	Jumper installed.

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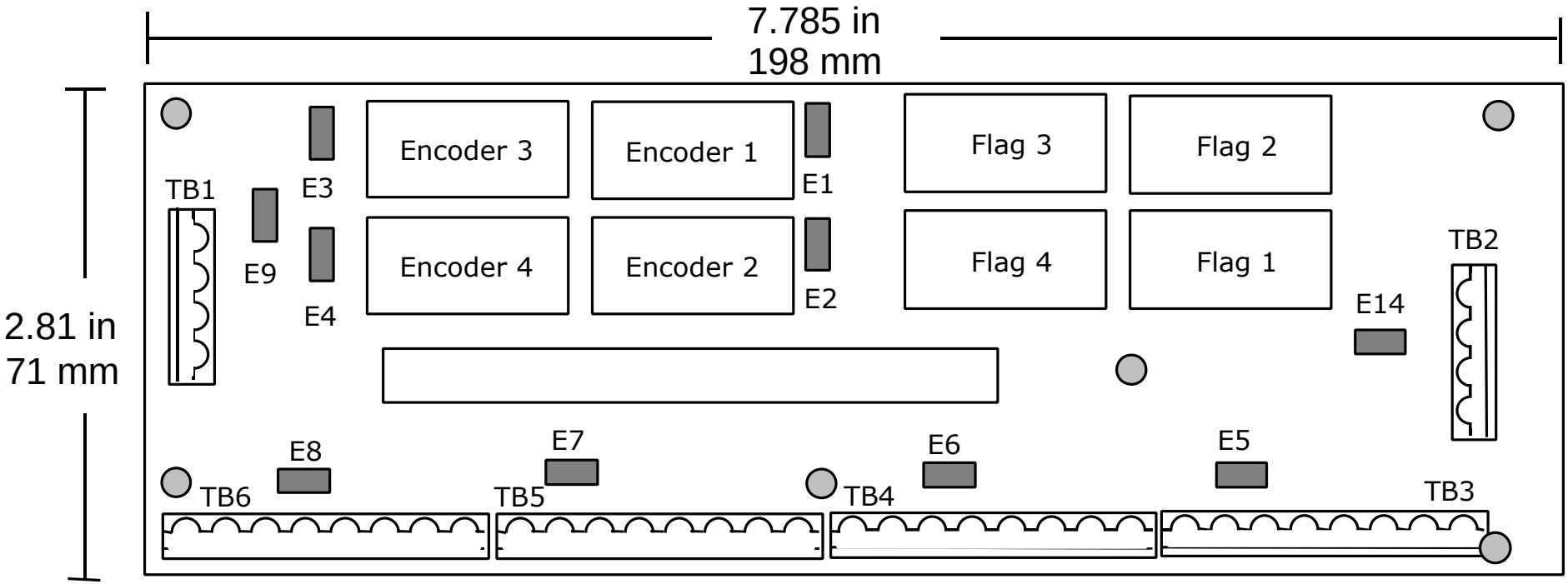
E14: CONNECT LIM+V TO ANALOG A+12V SUPPLY

E POINT & PHYSICAL LAYOUT	LOCATION	DESCRIPTION	DEFAULT
E14 		Jump pin 1 to 2 to tie the travel limits' LIM+V supply (pins 7, 8 and 9 of the male "Flag" connectors) to the analog A+12V supply connection on pin 1 of **TB2**.	Jumper installed.

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Note: All holes are 0.150 inch (3.8 mm) diameter.

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